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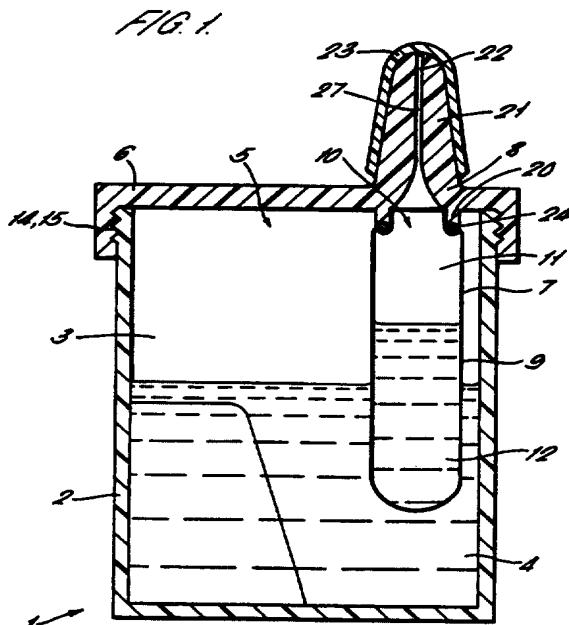
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US 4614267 A

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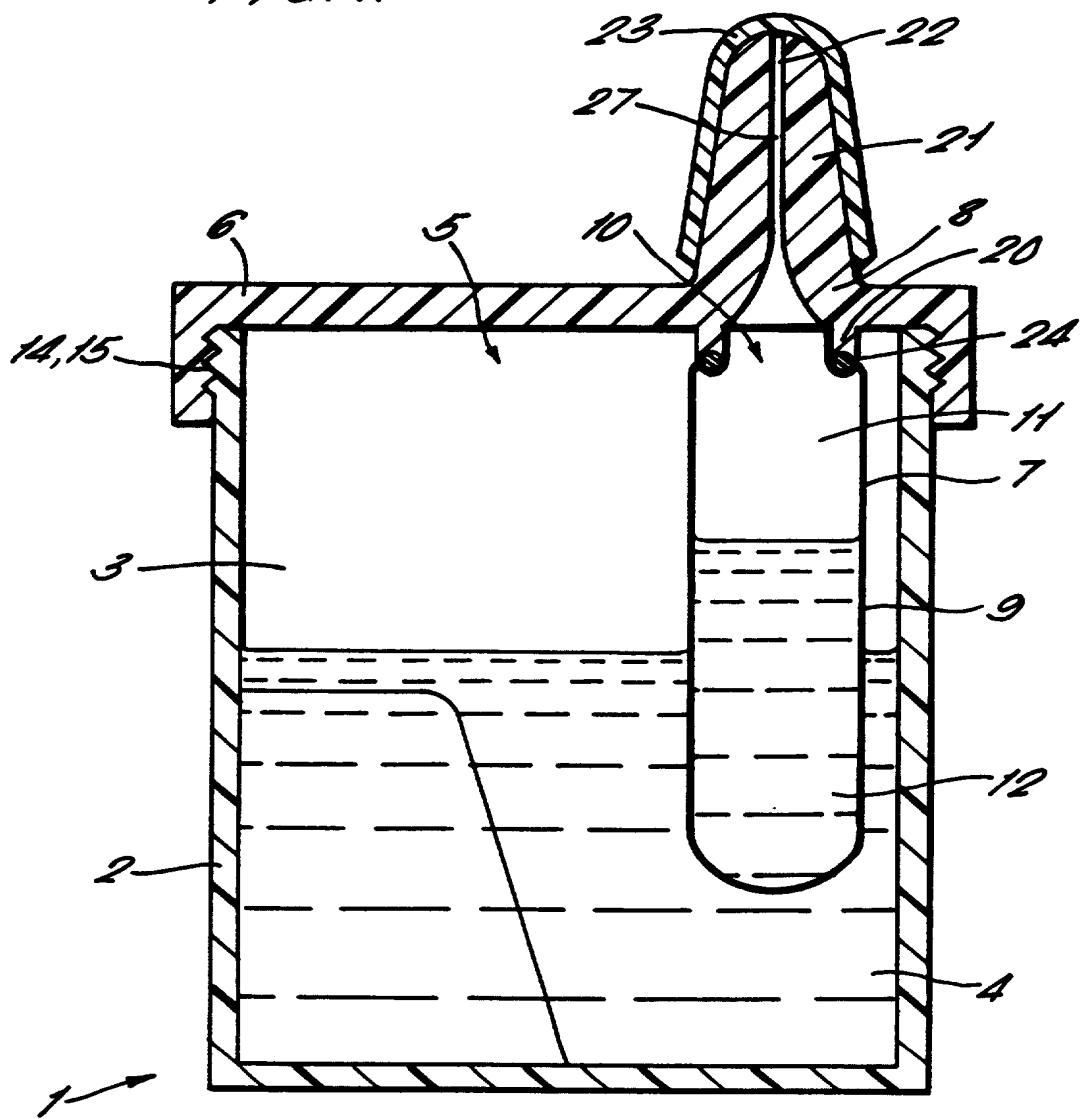
**Dual compartment dispensing apparatus**

(57) A dispensing apparatus 1 for storing two components prior to mixing comprises a first container 2 with an outlet 5 or 27, a second container 7 located within the first container, and attachment means 20 for releasably securing the second container to the first container. The second container may be released by manipulating an externally accessible part of the first container, for instance by rotating a screw-threaded or push-fit closure member 6 about a first axis, the second container being secured to the member at a point off-set from the first axis, and being released by engagement with an obstruction 26 in the first container. Alternatively, at least a part of the first container may be flexible so that an internal part of the first container can contact and release the second container. The second container may be attached to the first container via an O-ring 24, and may cover the outlet 27 which may be used to fill the second container.



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FIG. 1



DUAL COMPARTMENT DISPENSING APPARATUS

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This invention relates to an apparatus for separately storing and subsequently mixing two components of a substance to be dispensed.

10        Dual compartment dispensers for pharmaceutical, cosmetic and other fluid preparations typically comprise a chamber receiving a liquid and a separate compartment for a powder or liquid which is required to be separately stored until immediately prior to use  
15        of the mixture, this being particularly necessary where the mixture degrades rapidly with age.

20        Some known arrangements rely upon a seal being penetrated by a needle to initiate mixing, such arrangements being complex and requiring assembly from numerous components.

25        It is also known from US 4614267 to provide a vial which can be manually opened by manipulation through the sides of a flexible container within which it extends. Such an arrangement is, however, unsuitable to most applications where rigid or semi-rigid containers are required.

30        According to the present invention, there is disclosed apparatus for separately storing and subsequently mixing first and second components of a substance to be dispensed, the apparatus comprising:-

35        a first container;

a second container located within the first container;  
5 first outlet means allowing dispensing of the substance from the first container; and attachment means attaching the second container to the first container; wherein

10 the first container stores the first component prior to mixing;

the second container stores the second component separated from the first component prior to mixing;

15 the attachment means releasably secures the second container within the first container, the second container being releasable from attachment to the first container by a user of the apparatus and release of the second container from attachment to the first container allowing the second component stored in the second container to mix with the first component stored in the first container to form the substance in the first container, which substance is 20 then dispensed via the first outlet means.

25 Preferably the user releases the second container from attachment to the first container by manipulation of an externally accessible part of the first container.

30 In a first embodiment of the present invention the first container has a rotatable part which is rotatable relative to the remainder of the first container and the second container is released from attachment to the first container by rotating the rotatable part.

35 It is desired that the rotatable part is

rotatable about a first axis relative to the remainder of the first container;

5           the attachment means releasably attaches the second container to the rotatable member at a point off-set from the first axis of the container; and

10           an obstruction is provided in the first container such that as the rotatable member is rotated relative to the remainder of the first container, the second container is engaged by the obstruction and the engagement of the second container is thereby released from attachment to the second container.

15           The rotatable member is rotatably mounted to the remainder of the first container by co-operating screw-thread formations, the screw-thread formations being operable to urge the rotatable member into sealing engagement with the remainder of the first 20 container in response to rotation of the rotatable member relative to the remainder of the first container.

25           Alternatively the rotatable member is mounted to the remainder of the first container by means of a push-fit, the rotatable member being retained by the interference between a circumferential rib on the first container with a circumferential groove on the rotatable member, the rotatable member being free to 30 rotate relative to the remainder of the first container.

35           In a second embodiment of the present invention at least a part of the first container is flexible whereby the first container can be flexed sufficiently

to bring an internal part of the first container into engagement with the second container and thereby release the second container from attachment to the first container.

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Advantageously the attachment means secures the second container in a location covering the first outlet means so that the second container both prevents egress from the first container and is fillable with the second component via the first outlet means.

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Preferred embodiments of the present invention will now be described by way of example only and with 15 reference to the accompanying drawing, in which:

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Figure 1 is a sectioned elevation of an apparatus in accordance with the present invention.

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An apparatus 1 according to a first embodiment of the present invention as shown in Figure 1 consists of a first container 2 defining a chamber 3, in which a liquid first component 4 is stored and an outlet 5 at an upper end. The first container 2 comprises a 25 rotatable closure member 6 which closes the upper end.

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The apparatus 1 further comprises a second container 7, within the first container 2, of which a first portion 8 is formed unitarily with the closure member 6 and is off-set from a first, central longitudinal axis of the first container 2, and of which a second portion 9 is cylindrically walled and cup-shaped with a mouth 10 sealed by the first portion 8. The second portion 9 is not limited to being 30 cylindrical and may be any shape capable of being 35

5 contained within the first container 2. The first portion 8 comprises a cylindrical portion 20 engagable with the second portion 9 of the second container 7 and a nozzle 21 protruding from the upper surface of  
10 the closure member 6. The nozzle 21 has a nozzle opening 22 communicating with the inside of the second container 7 via a first outlet 27 which may be sealed by a closure cap 23. The closure cap 23 may consist of a push-fit stopper which sealingly engages the  
15 nozzle opening 22 or may alternatively comprise a screw-threaded or push-fit cap engagable with the external surface of the nozzle 21. The first outlet 27 may alternatively be sealed by a snap-off tip such as is commonly found on glue dispensing tubes, wherein snapping off of a portion of the nozzle 21 exposes the first outlet 27.

20 The second container 7 thereby defines a closed compartment 11 in which a liquid second component 12 is stored separately from the first component 4 prior to mixing.

25 The first container 2 is bottle shaped and may be formed of a flexible or semi-rigid plastics material.

30 The closure member 6 of the first container 2 may be formed so that the closure member 6 is a push-fit onto a remainder of the first container 2. A circumferential rib on an external surface of the first container 2 and a circumferential groove on an internal surface of the closure member 6 provide a means of resiliently retaining the closure member 6 on the remainder of the first container 2 during use of the apparatus 1. The rib and groove restrict axial  
35 movement of the closure member 6 relative to the first

5      container 2 but allows the closure member 6 to freely rotate about the first longitudinal axis of the first container 2. Equally, the circumferential groove could be on an external surface of the remainder of the first container 2 and the circumferential rib on an internal surface of the closure member 6.

10     Alternatively the remainder of the first container 2 is provided with external screw-threads 14 engaging with co-operating internal screw-threads 15 on the closure member 6. The screw-threads 14 and 15 are ramped to allow the closure member 6 to be assembled by axial movement onto the remainder of the first container 2, the ramped shape of the screw-threads allowing the diameter of the closure member 6 to be momentarily increased by resilient deformation during assembly.

20     Thus the rotatable closure member 6 forms a rotatable part of the first container 2, rotatable relative to the remainder of the first container 2.

25     The first and second portions 8 and 9 of the second container 7 may be separate components sealingly engaging with one another by means of a push-fit. The integrity of the seal between the first and second portions 8 and 9 may be improved by incorporating an O-ring 24 between the first and second portions 8 and 9. Thus the push-fit between the first and second portions 8 and 9 forms a means of attaching the second container 7 within the first container 2. Alternatively, the second container 7 may consist of a single component having an area of weakness at the junction between the first and second portions 8 and 9. This area of weakness may consist

of a scored circumferential line around the second container 7 or a portion of the second container 7 where the thickness of the wall is thinner than in the remainder of the second container 7. Thus the  
5 manufacture of the second container 7 as a single component connected to the closure member 6 forms an alternative means of attaching the second container 7 within the first container 2. The second container 7 may be manufactured from a plastics material, glass,  
10 or other suitable material.

The operation of the apparatus 1 will now be described.

15 Preferably, the apparatus 1 is sold having the first and second liquid components 4 and 12 already contained within the first and second chambers 3 and 11. The first chamber 3 is filled through the outlet 5 before the remainder of the first container 2 is  
20 sealed by the rotatable closure member 6. In the case where the first and second portions 8 and 9 are separate components the second chamber 11 may be filled through the mouth 10 of the second portion 9 before it is sealingly engaged with the first portion 8. Alternatively, where the second container 7 is a single component, the second chamber 11 is filled through the first outlet 27. Alternatively the single component second chamber 7 can be filled through a base portion of the second container and then the base portion can be sealed, for example by heat sealing the  
25 material. The closure cap 23, if used, is then sealingly engaged with the nozzle opening 22 and the rotatable closure member 6 is sealingly engaged with the first container 2.

In order to dispense the two components 4 and 12, a user of the apparatus 1 rotates the closure member 6 relative to the remainder of the first container 2 about the longitudinal axis of the first container 2.

5 Where the closure member 6 is a push-fit onto the remainder of the first container 2 the closure member 6 may be rotated either in the clock-wise or anti-clockwise sense without altering the operation of the apparatus 1. Where the closure member 6 is a screw

10 fit, the closure member 6 would be operable by rotating in a single sense. It should be noted that the screw-threads 14, 15 are such that adequate rotation of the closure member 6 in order to disengage the second portion 9 is possible without detaching the

15 closure member 6 from the remainder of the first container 2. Since the first portion 8 of the second container 7 is formed with the closure member 6 off-set from the first, central axis of the first container 2 rotation of the closure member 6 causes

20 the second container 7 to move within the first container 2, as seen in plan view of the apparatus 1. An inwardly extending flange 26 joined to the internal surface of the first container 2 forms an obstruction blocking the movement of the second container 7.

25 Preferably, the flange 26 is positioned towards the base of the first container 2. As the second container 7 is moved within the first container 2, the second portion 9 strikes the flange 26 and is thus disengaged, as the closure member 6 and first portion 8 are further rotated, from the second portion 8 and 30 9 disconnecting or the single component second container 7 breaking at the area of weakness. Thus the second portion 9 of the second container 7 falls 35 into the first container 2 and the first and second

liquid components 4 and 12 are free to mix. The  
obstruction need not be a flange but can equally be  
any obstruction wherein movement of the second  
container 7 laterally brings the second container 7  
5 into contact with the obstruction, for example, the  
second portion 9 may be positioned in and surrounded  
by a bowl-shaped depression.

10 Mixing of the two components 4 and 12 may be  
aided by shaking the apparatus 1.

15 The closure cap 23 is then removed from the  
nozzle opening 22 and the liquid is dispensed back  
through the first portion 8 of the second container 7  
and the nozzle 21 and nozzle opening 22. Preferably,  
the first container 2 is semi-rigid and squeezable and  
dispensation of the liquid is aided by squeezing the  
first container 2 to dispel the liquid through the  
nozzle opening 22.

20 Alternatively the apparatus 1 according to a  
second embodiment of the present invention comprises a  
closure member 6 which is not rotatable but is  
operated by squeezing the first container 2, made from  
25 a semi-rigid material, so that an internal part of the  
first container 2 comes into contact with the second  
portion 9 of the second container 7 causing the second  
portion 9 to disengage from the first portion 8,  
either by the disconnection of the first and second  
30 portions 8 and 9 or the breaking of the area of  
weakness of the second container 7. The two components  
4 and 12 are then free to mix and be dispensed as  
described above. The material of the first container 2  
must be sufficiently flexible to allow an internal  
35 part of the first container 2 to contact the second

container 7.

The apparatus is not limited to the mixing of two liquids and may alternatively be used to mix a powdered component and a liquid component together. 5 The powdered component may be in the first chamber 3 and the liquid component in the second chamber 11. Alternatively, the powdered component could be in the second chamber 11 and the liquid component in the 10 first chamber 3.

It is to be desired that the second container 7 is made of a rigid material, whether glass or plastic. 15 This is advantageous in that external manipulation of the first container 2 will not apply increased pressure to the second liquid component 12 in the second chamber 11 before the two liquid components 4 and 12 have been mixed. This helps to prevent the second liquid component 12 being dispensed on its own 20 through the nozzle opening 22, either accidentally or through deliberate misuse of the apparatus 1.

It should be appreciated that modifications may 25 be made to the apparatus as described above without departing from the scope of the invention as set out in the attached claims.

CLAIMS:

5       1. Apparatus for separately storing and subsequently mixing first and second components of a substance to be dispensed, the apparatus comprising:-

10               a first container;  
              a second container located within the first container;  
              first outlet means allowing dispensing of the substance from the first container; and  
              attachment means attaching the second container to the first container; wherein

15               the first container stores the first component prior to mixing;

              the second container stores the second component separated from the first component prior to mixing;

20               the attachment means releasably secures the second container within the first container, the second container being releasable from attachment to the first container by a user of the apparatus and release of the second container from attachment to the first container allowing the second component stored in the second container to mix with the first component stored in the first container to form the substance in the first container, which substance is then dispensed via the first outlet means.

25               30       2. Apparatus as claimed in claim 1 wherein the user releases the second container from attachment to the first container by manipulation of an externally accessible part of the first container.

3. Apparatus as claimed in claim 2 wherein the first container has a rotatable part which is rotatable relative to the remainder of the first container and the second container is released from attachment to 5 the first container by rotating the rotatable part.

4. Apparatus as claimed in claim 3 wherein:-

10 the rotatable part is rotatable about a first axis relative to the remainder of the first container;  
15 the attachment means releasably attaches the second container to the rotatable member at a point off-set from the first axis of the container; and  
20 an obstruction is provided in the first container such that as the rotatable member is rotated relative to the remainder of the first container, the second container is engaged by the obstruction and the engagement of the second container is thereby released from attachment to the second container.

25 5. Apparatus as claimed in claim 4, wherein the rotatable member is rotatably mounted to the remainder of the first container by co-operating screw-thread formations, the screw-thread formations being operable to urge the rotatable member into sealing engagement with the remainder of the first container in response 30 to rotation of the rotatable member relative to the remainder of the first container.

35 6. Apparatus as claimed in claim 4, wherein the rotatable member is mounted to the remainder of the first container by means of a push-fit, the rotatable

member being retained by the interference between a circumferential rib on the first container with a circumferential groove on the rotatable member, the rotatable member being free to rotate relative to the 5 remainder of the first container.

7. Apparatus as claimed in claim 1 or claim 2, wherein at least a part of the first container is flexible whereby the first container can be flexed 10 sufficiently to bring an internal part of the first container into engagement with the second container and thereby release the second container from attachment to the first container.

15 8. Apparatus as claimed in claim 7, wherein the attachment means secures the second container in a location covering the first outlet means so that the second container both prevents egress from the first container and is fillable with the second component 20 via the first outlet means.

9. Apparatus substantially as hereinbefore described with reference to and as shown in the accompanying drawing.

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14.

**Application No:** GB 9715475.1  
**Claims searched:** 1-9

**Examiner:** Michael Logan  
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**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B8D (DSC1)

Int Cl (Ed.6): B65D 25/08, 51/28, 81/32

Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X, Y	GB 2298406 A (BESPAK) see especially figs 7-11	X:1-3 Y:8
X	GB 1142293 (MODERN) whole document relevant	1-4
X	WO 88/01973 A1 (WELLA) whole document relevant	1-6
X, Y	US 4614267 (ABBOTT) see figs 1-3	X:1,2,7 Y:8

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.